

WHAT IS CLAIMED IS:

1. An image pickup apparatus capable of performing an image pickup with pattern projection on an object to obtain three-dimensional information on the object, and an image pickup without pattern projection, comprising:

an exposure level determination section configured to determine a predetermined exposure level needed by an image pickup device of the image pickup apparatus;  
10 and

a shutter speed determination section configured to determine a first shutter speed to achieve the predetermined exposure level determined by the exposure level determination section in the image pickup without pattern projection, and a second shutter speed not  
15 slower than the first shutter speed, wherein

the image pickup with pattern projection is conducted by use of the second shutter speed.

2. The apparatus according to claim 1, wherein  
20 the second shutter speed is a shutter speed faster than the first shutter speed.

3. The apparatus according to claim 1, wherein the image pickup apparatus is a stereographic image pickup apparatus capable of picking up images of the object from a plurality of view points, and  
25 the pattern is a random dot pattern.

4. The apparatus according to claim 1, wherein

the pattern is projected by use of light emitted from a flash emission source.

5        5. The apparatus according to claim 1, wherein the shutter speed determination section determines the second shutter speed so as to take a time longer than a time in which the pattern is projected.

10        6. The apparatus according to claim 1, further comprising an image pickup aperture adjustment section configured to adjust an image pickup aperture, wherein the image pickup aperture adjustment section adjusts the image pickup aperture to have the predetermined exposure level at the second shutter speed when the image pickup with pattern projection is conducted.

15        7. The apparatus according to claim 1, wherein the shutter speed determination section determines at least one of the second shutter speed and the image pickup aperture of the image pickup apparatus on the basis of luminance information on the object when the pattern is projected and of the predetermined exposure level.

20        8. The apparatus according to claim 1, wherein the shutter speed determination section determines the first shutter speed on the basis of an image pickup aperture determined in accordance with a desired field depth set by an operator and of the predetermined exposure level.

9. The apparatus according to claim 8, wherein the image pickup aperture is an aperture not smaller than an aperture that can achieve the predetermined exposure level in the image pickup with pattern  
5 projection on the assumption that the shutter speed of the image pickup apparatus takes the same time as a projection time of the pattern.

10. The apparatus according to claim 1, further comprising an illumination section configured to  
10 illuminate the object during the image pickup, wherein the image pickup apparatus picks up an image of the object illuminated by the illumination section by use of a shutter speed not slower than the second shutter speed.

15 11. An image pickup apparatus comprising:  
an image pickup section, including an image pickup device, configured to pick up an image of an object;  
a photometric section configured to measure luminance information on the object;  
20 a projection section configured to project a pattern on the object during the image pickup, the image pickup apparatus being capable of performing an image pickup by the image pickup section with pattern projection by the projection section on the object to  
25 obtain three-dimensional information on the object, and an image pickup by the image pickup section without pattern projection;

an exposure level determination section configured to determine a predetermined exposure level needed by the image pickup device; and

5 a shutter speed determination section configured to determine a first shutter speed to achieve the predetermined exposure level determined by the exposure level determination section in the image pickup without pattern projection, and a second shutter speed not slower than the first shutter speed, on the basis of  
10 luminance information on the object measured by the photometric section, wherein

the image pickup section conducts the image pickup with pattern projection by the projection section by use of the second shutter speed.

15 12. A method of an image pickup for an image pickup apparatus capable of performing an image pickup with pattern projection on an object to obtain three-dimensional information on the object, and an image pickup without pattern projection, the method  
20 comprising:

determining a predetermined exposure level;

determining a first shutter speed to achieve the predetermined exposure level in the image pickup without pattern projection, and a second shutter speed  
25 not slower than the first shutter speed; and

conducting the image pickup with pattern projection by use of the second shutter speed.

13. A method of controlling an image pickup apparatus capable of performing an image pickup with pattern projection on an object to obtain three-dimensional information on the object, and an image pickup without pattern projection, the method  
5 comprising:

determining a predetermined exposure level; and  
determining a first shutter speed to achieve the predetermined exposure level in the image pickup  
10 without pattern projection, and a second shutter speed not slower than the first shutter speed, wherein  
the second shutter speed is used when the image pickup with pattern projection is conducted.

14. An image pickup apparatus capable of  
15 performing an image pickup with pattern projection on an object to obtain three-dimensional information on the object, and an image pickup without pattern projection, comprising:

exposure level determination means for determining  
20 a predetermined exposure level needed by an image pickup device of the image pickup apparatus; and

shutter speed determination means for determining a first shutter speed to achieve the predetermined exposure level determined by the exposure level  
25 determination means in the image pickup without pattern projection, and a second shutter speed not slower than the first shutter speed, wherein

the image pickup with pattern projection is conducted by use of the second shutter speed.

15. An image pickup apparatus comprising:

image pickup means, including an image pickup  
5 device, for picking up an image of an object;

photometric means for measuring luminance  
information on the object;

projection means for projecting a pattern on  
the object during the image pickup, the image pickup  
10 apparatus being capable of performing an image pickup  
by the image pickup means with pattern projection by  
the projection means on the object to obtain three-  
dimensional information on the object, and an image  
pickup by the image pickup means without pattern  
15 projection;

exposure level determination means for determining  
a predetermined exposure level needed by the image  
pickup device; and

shutter speed determination means for determining  
20 a first shutter speed to achieve the predetermined  
exposure level determined by the exposure level  
determination means in the image pickup without pattern  
projection, and a second shutter speed not slower than  
the first shutter speed, on the basis of luminance  
25 information on the object measured by the photometric  
means, wherein

the image pickup means conducts the image pickup

with pattern projection by the projection means by use  
of the second shutter speed.